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Abstract

This study investigated (1) the difference, if any, between the achievement in reading readiness of younger kindergarten children (4 years 9 months to 5 years 1 month upon school entrance) and older children (5 years 5 months to 5 years 8 months at entrance), (2) whether kindergarten positively affects the reading readiness achievement of children regardless of age, and (3) whether younger kindergarten children with training equal the level of reading readiness attained by the older kindergarten children with training. The 39 middle class children were measured with the Lee-Clark Reading Readiness Test after 5 weeks of school and again after 90 days. Results indicated (1) that there was a positive relationship between reading readiness achievement and kindergarten training in younger children, and (2) that without kindergarten training, maturation plays a large part in affecting children's reading readiness achievement. It was concluded that early exposure to formal school training is desirable for all children, and a reevaluation and revision of available reading readiness tests was suggested. (DR)

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# A COMPARISON OF READING READINESS ACHIEVEMENT OF KINDERGARTEN CHILDREN OF DISPARATE ENTRANCE AGES

by

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# A COMPARISON OF READING READINESS ACHIEVEMENT OF KINDERGARTEN CHILDREN OF DISPARATE ENTRANCE AGES

This study investigated if there is a measurable difference between the reading readiness achievement of younger kindergarten entrants (ages four years, nine months to five years, one month) and older entrants (five years, five months to five years, eight months). The study also investigated whether kindergarten training positively affects reading readiness achievement of all children. It further ascertained whether the younger entrants after kindergarten equalled the level of reading readiness of the older children after schooling.

The Lee-Clark Reading Readiness Test - Kindergarten and Grade 1, 1962 Revision was used as the measuring instrument. The same form was administered since no alternate form was available. The tests were given after five weeks of school and again after ninety days. Neither group benefitted from the practice effect since both groups were equally exposed. Eighteen children were in the younger group; twenty-one were in the older group.

This study ascertained that kindergarten training has a positive effect upon the reading readiness achievement of kindergarten children of disparate entrance ages. A comparison of the means of the first and second tests of each group showed a level of significance (P) of less than .01.

The study further indicated that there is a significant difference in the rate of rise in the reading readiness achievement of younger children when compared to the older children. P was .05 when comparing the difference of the means of the second test of the younger children with the first test of the older children. A comparison of the means of the point gain of both groups in the two tests showed P to be .055. Both results were significant in indicating the positive relationship between reading readiness achievement and kindergarten training in younger children.

A level of significance (P) of .083 when comparing the means of the second tests of both groups was obtained. It therefore was not ascertained conclusively that younger children after kindergarten do not attain the same level of reading readiness achievement as the older children after kindergarten training.

On the basis of the small sample involved in this study, the researcher concludes that exposure to kindergarten is beneficial to all children and has a positive effect upon reading readiness achievement. Early exposure to formal school training seems indicated for all children. However, in the interests of better prognosis for reading achievement in the elementary grades, a reevaluation and revision of the present available reading readiness tests for use in the kindergarten is suggested.

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# Chapter I

## THE PROBLEM

In school systems throughout the United States, the age at which children become eligible for kindergarten varies within a few months (e.g. children who are five in September, or later that year, are eligible to register). However, in all school systems, the age span of all the kindergarten children within any one school system is one full year, unless a child has been denied promotion to first grade. Little research has been carried out with kindergarten children to determine the effect of the one year age span on the achievement and maturation of these youngsters. It is the purpose of this study to determine if there is a measurable difference in achievement in reading readiness of kindergarten children of disparate entrance ages.

### 1. SPECIFIC PROBLEMS

The investigation will determine if there is a measurable difference between the achievement in reading readiness of younger kindergarten children (four years nine months to five years one month upon entrance to school), and older kindergarten children (five years five months to five years eight months upon entrance to school), as measured by the Lee-Clark Reading Readiness Test. The study will further investigate whether kindergarten training positively affects the reading readiness achievement of children regardless of age. In addition, this inquiry will ascertain whether the

younger kindergarten children with schooling equal the level of reading readiness attained by the older kindergarten children with schooling.

## 2. DEFINITIONS OF TERMS USED

Achievement, pupil. "A pupil's status with reference to attained skills or knowledge, usually as compared with that of other pupils or with the scholastic standards of the school."[1]

Children, older. Kindergarten children whose birthdays are in January, February, March or April of 1963, and who were five years, five months; five years, six months; five years, seven months, or five years, eight months of age upon entrance to school.

Children, younger. Kindergarten children whose birthdays are in October, November or December, and who were four years, nine months; four years, ten months, or four years, eleven months of age upon entrance to school.

Headstart. Those federally funded programs set up for four year olds and administered by public and private agencies to lessen the educational gap between children from low socio-economic environments and middle-class children. The programs vary in length of time the children attend -- some are summer programs and others are year round.

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[1]Carter V. Good (ed.), Dictionary of Education (New York and London: McGraw-Hill Book Company, Inc., 1945), p. 6.

Pre-kindergarten. Those programs licenced and accredited by New York State for three-to-five year olds in nursery and public schools; those special classes which the New York City Board of Education has set up for children who are culturally deprived. Differentiation is made between private nursery schools and those classes for pre-school four year olds which are specifically attempting to bridge the educational gap between the low socio-economic environment of ghetto children and that of the middle-class socio-economic group.

Reading readiness. "1) a level in child development requisite for learning to read; usually understood to imply a chronological age of six years, an IQ of 100 or more, and no special handicaps (such as severe personality maladjustment, mutism, faulty vision or hearing, etc.) to interfere with progress; 2) the physical, mental, and emotional maturation necessary for undertaking instruction in reading at a given level of difficulty."[2]

## 3. DELIMITATIONS OF THE STUDY

The population sample chosen were two kindergarten classes composed of the eighteen youngest and the twenty-one oldest children in a New York City public school. The children attend a morning or afternoon session taught by the same teacher. The curriculum is the same for both sessions, with

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[2] Ibid., p. 329.

modifications where time limitations occur. The teaching methods used are basically similar for both classes, with individual instruction given as needed.

The choice of a testing instrument was limited to a group test. All measures of reading readiness available at the present time, are designated as measurement indices for children at the end of kindergarten and/or the beginning of first grade. The Lee-Clark Reading Readiness Test was chosen as the most appropriate for ease in administering to young children unfamiliar with school and test experiences. This was a prime consideration, even though there is only one form of the test available. The reliability of the Lee-Clark Test is based on the responses of children at the end of a full year of kindergarten instruction. The subjects in this study were tested after twenty-one and twenty-four days of school and re-tested sixty-six and sixty-nine days later (each child's school attendance calendar was ninety days, irrespective of individual absences). The reliability coefficient of the test is 0.96 and the predictive validity coefficients are from .42 to .56.[3]

Additional uncontrolled variables include the disruptive school year; the variance in hours of schooling between and within the groups, and the difference in individual absence patterns of the subjects. (See Chapter 3, pages 17-18).

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[3]J. Murry Lee and Willis W. Clark, Manual -- Lee-Clark Reading Readiness Test -- Kindergarten and Grade 1, 1962 Revision (Monterey, California: McGraw-Hill, Inc., 1962), p. 4,6.

## 4. BASIC HYPOTHESES

The hypotheses of this study are: 1) kindergarten training has a positive effect upon the reading readiness achievement of all children; 2) there is a significant difference in the reading readiness achievement of younger kindergarten children as measured by the Lee-Clark Reading Readiness Test, when compared with the older children; 3) younger kindergarten children after kindergarten training do not attain the same level of reading readiness achievement as the older kindergarten children after kindergarten training.

## 5. IMPORTANCE OF THE STUDY

In the New York City school system, children whose fifth birthday falls between January first and December thirty-first are admitted to kindergarten. The study will inquire into the advisability of admitting children to kindergarten as early as four years, eight months, with automatic promotion to first grade as early as five years, eight months. (Notice should be made of an exception to the admission age of first grade children for those who have attended a licensed New York State nursery school with an accredited kindergarten program. These latter children are permitted entrance to first grade as young as five years, five months of age.) The investigation will also seek to determine whether these very young children will mature and improve in reading readiness sufficiently to enter first grade on a par with their peers

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who are six months, or more, older than they.

It is further apparent with the current national emphasis on Early Childhood education, pre-kindergarten classes and Head-start programs, that more research is necessary into the rate of learning and retention of learning of pre-kindergarten and kindergarten children in school situations. Valid testing programs to measure these factors will be needed which can easily be administered by the classroom teacher to small groups of children. An individual testing program is the ideal, but is proscribed for general school use due to lack of personnel and cost of administering the tests.

## CHAPTER II

## RELATED RESEARCH

Relatively little research has been done to measure growth and achievement in reading readiness in the kindergarten. The paucity in the number and range of group readiness tests for use in the kindergarten is one indication of this statement. Buros lists sixteen tests which may be used to measure reading readiness. All are for use at the beginning of first grade; ten may be used at the end of kindergarten; one is a rating scale for use by the teacher. None of the tests measures achievement in reading readiness in kindergarten, and only three have two forms, which may be used to retest children whose original scores indicate re-testing.[4] Most research about kindergarten children has been done in related areas and/or when the children are in grade one or higher.

Hillerich[5] has tested the use of workbooks in a formal reading readiness program. He found that the kindergarten children using reading readiness workbooks in kindergarten did better in first grade than kindergarten children not taught with this material. However, Hillerich tested the children at the beginning and end of first grade. His study made no differ-

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[4]Oscar Kristen Buros, Tests in Print, The Gryphon Press, Highland Park, New Jersey, 1961.

[5]Robert L. Hillerich, "Pre-Reading Skills in Kindergarten: A Second Report," Elementary School Journal, LXV (March, 1965), 312-317.

entiation between the ages of the children, sex, or how the experimental and control kindergarten classes were chosen.

Blakely and Shadle also tested the use of workbooks in kindergarten as against an experience-activity program. They found that there were no significant differences among the children before the program was initiated. It seems significant that they found the restrictiveness of the reading readiness workbook approach has a negative effect on the boys; boys in the control group did much better. The program had no appreciable effect on either group of girls. Blakely and Shadle tested twenty-eight children in each group with a mean age of five years, six months for the girls and five years, nine months for the boys (the authors do not say when the mean age was calculated).[6]

The age of admission to school has been the subject of a number of studies. Rowland and Nelson suggest flexible admission programs based on the needs of children as determined by a testing program, rather than an arbitrary age qualification. They cite negative community response as the reason for some school systems giving up testing as a basis for admission to first grade.[7]

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[6]W. Paul Blakely and Erma M. Shadle, "A Study of Two Readiness-for-Reading Programs in Kindergarten," Elementary English, November, 1961, 502-505.

[7]Thomas D. Rowland and Clavin C. Nelson, "Off to School -- At What Age?", Elementary School Journal, LX (October, 1959) 18-23.

Gelles and Coulson deserve considered attention in their study of entrance age to kindergarten. They found:

> "Many younger children entering kindergarten were not ready to profit from school experiences. If this were simply a matter of not gaining something it would not be too bad. But, rarely does the situation confine itself to the academic area of no gain -- it almost always edges its way into the negative area of social and emotional maladjustment, academic failure, difficulty with reading and the like. These problems arise when the child enters kindergarten at an age younger than most of his fellow entrants." [8]

Gelles and Coulson do not give statistics, but they emphasize two important factors relating to five and six year olds. Children of this age group are normally far-sighted, which has an effect on visual perception; rate of growth of children is not uniform. In view of their study, the authors recommend (and cite that three out of four authorities agree) October first (four years eleven months of age) as the cut-off date for entrance to kindergarten.[9]

Lowell Burney Carter tested sixth grade children to determine the effects of early school entrance. While he made no determination of which children had kindergarten experience, he found:

> "1. The chronologically older child appears to have the advantage in academic achievement over the younger child when given the same school experiences.

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[8] Herbert M. Gelles and Marion C. Coulson, "At What Age Is A Child Ready For School?", The School Executive, LXXVIII (August, 1959) p. 30.

[9] Ibid., p. 31.

"2. In general, the degree of scholastic achievement attained on the first achievement test tends to remain constant throughout the years in elementary school.

"3. The underage pupils making lower scores on the first achievement test did not overcome this inferior position in the remaining years in elementary school.

"4. The factor of chronological age has more effect on boys in relation to academic achievement than on girls. The underage boys made lower scores and fewer high scores than the underage girls.

"5. Factors other than intelligence and chronological age appear to have operated in the case of some underage children to produce academic achievement equal to or superior to normal age children.

"6. Conversely, factors other than intelligence and chronological age have operated in the case of some normal age children to retard normal academic achievement.

"7. In the subject areas most effectively taught, the coefficient of significant difference tends to rise sharply. For instance, grade level achievement in arithmetic was consistently lower than that of other academic fields tested. The T-tests revealed no significant difference in the achievement of normal age girls and underage girls in arithmetic, but in spelling, reading, and English the academic achievement of normal age girls was very significantly higher than that of the underage girls."

According to Carter's findings, "87 percent of underage children do not equal the scholastic achievement of normal age children."[10]

R. Vance Hall also based his findings on sixth graders. He found that 77.9 percent of boys under six years, six months

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[10]Lowell Burney Carter, "The Effect of Early School Entrance on the Scholastic Achievement of Elementary School Children in the Austin Public Schools," Journal of Educational Research, L (October, 1956) pp. 102-103.

entrance age to first grade were retained at some time in their elementary schooling, as compared with 22.1 percent of boys six years, six months or older on entrance to first grade. The percentage of girls was almost equal to the boys -- 80 percent to twenty percent. Hall's findings agree with Carter's that girls achieved at a higher level than boys, but that underage boys achieved at a lower level than any other group. Hall also found that in some areas, the younger boys were two years behind the average girls. He further states that differences in achievement increased from the third to the sixth grade.[11]

Dickinson and Larson also tested age as a criteria for school achievement. They evaluated fourth grade classes and had findings similar to Carter and Hall. They concluded: "... the fact that these differences still exist at the fourth grade level may point to a "snow-balling effect." The difference that existed at early ages may become magnified as the child becomes older."[12]

Inez B. King's findings agreed with the aforementioned studies. In addition she found: "Average daily attendance will be lower among younger entrants. Younger entrants are likely to

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[11]R. Vance Hall, "Does Entrance Age Effect Achievement," Elementary School Journal, LXIII (April, 1963) pp. 391-396.

[12]D. J. Dickinson and D. J. Larson, "The Effects of Chronological Age in Months on School Achievement," Journal of Educational Research, LVI (May-June, 1963) pp. 492-93.

show more indications of poor personal and social adjustment in school."[13]

In assessing the aforementioned studies and others relating to early entrance to school, no researcher indicated that his study had had any effect upon changing the entrance age, although each researcher recommended such a change. Most of the investigations concluded with that observation, but Ammons and Goodland suggest:

> "...this purpose has been to analyze the premise that decisions about school entrance age really reflect prior assumption of what a school is for. If a school is designed to expose children to a succession of carefully graded tasks beginning with the first grade, then the question of when children are best prepared to tackle these tasks is appropriate. To the degree children are held back from beginning these tasks, they will have less difficulty in accomplishing them and the school may take whatever questionable credit is forthcoming.....If, however, a school is designed to assist a child with these problems his development and culture present, then we had better turn our attention to where it belongs: the development of a curriculum that encompasses these problems in such a way that a child, beginning school at the time society sees fit to decree, will achieve maximum benefit from the environmental resources of that school."[14]

The Early Childhood News Letter reviews several studies which concur in their findings that younger children (October to December birthdays) have more difficulty in achievement in

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[13]Inez B. King, "Effect of Age of Entrance Into Grade I Upon Achievement in Elementary School," Elementary School Journal, LV (February, 1955) pp. 331-336.

[14]Margaret P. Ammons and John I. Goodland, "When to Begin (Dimensions of the First Grade Entrance Age Problem)," Childhood Education, Journal of the Association for Childhood, Education International, XXXII (September, 1955), p. 26.

school -- academically, emotionally and socially -- than older children (January, February, March birthdays). Boys were also found to adjust less well at all levels. So long as calendar age continues to be the chief criterion, it was recommended that a child be fully five years of age by September first, and preferably, boys should be fully five-and-a-half years of age for entrance to kindergarten.[15]

This study will try to determine whether disparity in ages of kindergarten children measurably affects achievement in reading readiness as measured by the Lee-Clark Reading Readiness Test. Present research indicates that children admitted to kindergarten at age four years eleven months or younger have more difficulty in school progress than those admitted to kindergarten at five years to five years, ten months of age. The varied aspects of previous research -- age, sex, grade tested, formal reading readiness programs, attendance patterns, etc. -- all point to the advisability of changing the prevalent admission age and/or programs in kindergarten and subsequent grades. Past studies suggest school admission to kindergarten at five years of age for girls and five-and-a-half years of age for boys, to permit normal maturation to regulate an equalization between boys and girls in the learning process in a formal school situation.

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[15] Early Childhood News Letter, Bureau of Early Childhood Education, Board of Education of the City of New York, (Feb.-Mar., 1969).

This study will determine if there is a measurable difference between the achievement in reading readiness of younger kindergarten children and older kindergarten children, as measured by the Lee-Clark Reading Readiness Test. The study will further investigate whether kindergarten training positively affects the reading readiness achievement of children regardless of age. In addition, this inquiry will ascertain whether the younger kindergarten children with schooling equal the level of reading readiness attained by the older children with schooling.

The hypotheses of this study are: 1) kindergarten training has a positive effect upon the reading readiness achievement of all children; 2) there is a significant difference in the reading readiness achievement of younger kindergarten children as measured by the Lee-Clark Reading Readiness Test, when compared with the older kindergarten children; 3) younger children after kindergarten training do not attain the same level of reading readiness achievement as the older children after kindergarten training.

# CHAPTER III

# DESIGN OF THE STUDY

## 1. SUBJECTS

Two kindergarten classes -- a morning and an afternoon class -- will be compared via a testing program using the Lee-Clark Reading Readiness Test. The classes are part of the New York City Board of Education, District 26, Queens, and are taught by a regularly licensed teacher of Early Childhood. The morning kindergarten is composed of twenty-one children -- ten boys and eleven girls. The afternoon kindergarten has eighteen children -- six boys and twelve girls.

All the children attending the morning class are the oldest children registered for kindergarten in this neighborhood school. The age range of the older children at admission to school in September, 1968, was five years, five months to five years, eight months.

Age Range of Older Children

| | 5 yrs. 5 mos. | 5 yrs. 6 mos. | 5 yrs. 7 mos. | 5 yrs. 8 mos. | Total | Median |
|---|---|---|---|---|---|---|
| Boys | 2 | 3 | 4 | 1 | 10 | 5 yrs. 6.5 mos. |
| Girls | 2 | 3 | 6 | 0 | 11 | 5 yrs. 7 mos. |

All the children attending the afternoon class are the youngest children registered for kindergarten in this neighborhood school. The age range of the younger children at admission to school in September, 1968, was four years, nine months to five years, one month.

Age Range of Younger Children

| | 4 yrs. 9 mos. | 4 yrs. 10 mos. | 4 yrs. 11 mos. | 5 yrs. 0 mos. | 5 yrs. 1 mo. | Total | Median |
|---|---|---|---|---|---|---|---|
| Boys | 3 | 2 | 1 | 0 | 0 | 6 | 4 yrs. 9 mos. |
| Girls | 5 | 5 | 1 | 0 | 1 | 12 | 4 yrs. 10 mos. |

The children born during the months of April to September are taught by another kindergarten teacher in a morning and an afternoon session. In order to equalize the class sizes for both teachers and each session, two children born in April and the one born in August were placed in the researcher's classes.

The kindergarten classes are composed of children from a middle-class, socio-economic group, whose parents earn between six and fifteen thousand dollars annually, with the median earning power about nine thousand dollars. Most of the bread-winners hold skilled blue collar or civil service jobs; few are professionals -- e.g. teachers, doctors, lawyers. When the bread-winners earn more than $12,000, they tend to move their families to a higher socio-economic environment in the suburbs. The children live in modest, one family houses or garden apartments.

Among the subjects being studied, there are no foster children and only one child with a single parent due to the death of the father. No divorce or desertion affects any of the families.

Ethnically, the backgrounds of the children include second and third generation Italian, Irish, German, Dutch and English, and those who have been Americans for many generations. There is one Puerto Rican child, born in New York, who has a slight

language difficulty since her parents speak mostly Spanish. There are no Orientals or Afro-Americans in the groups.

Religious affiliations seem to be strong, judging by the number of children who prattle about Sunday school and prayers and other religious matters. There is one Jewish child in each class; the remainder of the children are Catholics and Protestants. Last year, almost half of all the kindergarten children enrolled in this public elementary school transferred to Catholic parochial schools for first grade and subsequent schooling.

The children taught by the other kindergarten teacher are from the same socio-economic background.

## 2. SETTING

The classroom is a fully equipped modern kindergarten room in a fifteen year old school building, which is exceptionally well-kept. It meets all standards of health and safety.

The school day for the morning kindergarten class is normally 8:40 a.m. to noon, with children who are bused to school arriving at approximately 8:50 a.m. The afternoon class is normally 12:50 p.m. to 3:00 p.m., with bus children leaving at 2:50 p.m.

For the period, November 25, 1968 through April 22, 1969, an additional forty-five minutes has been added to the school day. This additional time is to compensate for the loss of schooling during the teachers' strike at the beginning of the school

year*. This change in scheduling affects the kindergarten schedule as follows:

| | A.M. Kgn. | P.M. Kgn. |
|---|---|---|
| Walkers' Arrival | 8:10 a.m. | 12:50 p.m. |
| Bus Arrival | 8:50 a.m. | 12:50 p.m. |
| Walkers' Dismissal | 12 Noon | 3:15 p.m. |
| Bus Dismissal | 12 Noon | 2:50 p.m. |

As of March 10, 1969, the bus time schedule was adjusted and the new arrival time was 8:30 a.m. and dismissal time 3:10 p.m., thereby lengthening both sessions by twenty minutes for bused children.

This wide discrepancy in hours of classroom instruction between morning and afternoon classes and within each class was unfortunate. It is of importance to note, however, that when these children are promoted to first grade, their record cards will make no differentiation in length of schooling. They will be treated as being ready for a formalized reading program on an equal basis with their peers.

Both the classes are taught by the researcher. The prescribed New York City Board of Education curriculum bulletins in language arts, reading, mathematics, science, art, social studies, physical education and kindergarten are followed.** Time allowances for the subject matter taught perforce varies between the morning and the afternoon classes. Obviously, many aspects of

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*Schooling was interrupted due to the teachers' strike at the beginning of the school year. For detailed days of school sessions, see appendix, pp. 44-45.

**Refer to bibliography, p. 49.

enrichment are excluded from the latter class in order that the essentials of the curriculum are included.

The reading readiness program followed by the teacher is an informal one. Teacher-made games and materials, work sheets, informal tests, children's research and homework are based on the subject matter taught in class. The children's research and homework consist of questioning parents and older siblings, finding pictures in magazines and newspapers relating to phonics, social studies and mathematics, exploring the home and neighborhood for science and geographic phenomena. No formal workbooks are used. "My Weekly Reader Surprise" is used in conjunction with the program as supplementary and incidental material.

Children who are too immature physically, emotionally, psychologically or mentally, are not penalized for inability to do readiness work. Exposure to this work, however, is beneficial to them.

## 3. THE MEASURING INSTRUMENT

The Lee-Clark Reading Readiness Test -- Kindergarten and Grade 1, 1962 Revision was chosen because it is a group test which takes approximately thirty minutes to administer, including a few minutes between tests two and three for tension relaxing finger plays and body movements. This is the shortest reading readiness

test according to Oscar Buros.[16] Panther mentions the ease in administering the Lee-Clark Reading Readiness Test, and "...when given at the beginning of first grade, was the most valid predictor of reading achievement."[17] The manual for the test states that the "total score has exceptional reliability, especially for an instrument used with very young and inexperienced examinees."[18]

The Lee-Clark Test Manual states that a reading readiness test "...is most useful if administered before or at the approximate time the pupil is ready to start formalized reading. There are two recommended testing times: the end of kindergarten and entrance to first grade."[19]

Although reading readiness tests are usually administered at the end of kindergarten or the beginning of first grade, for the purposes of this study, the test was given after five weeks of school (week of December 2, 1968), and re-testing took place after a total of ninety school days (week of March 17, 1969).

The same test was used since no other form was available. However, neither group benefited from the practice effect of the first test situation, since both groups were equally exposed.

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[16]Oscar Kristen Buros, (ed.), The Fifth Mental Measurements Yearbook, (The Gryphon Press, Highland Park, New Jersey), 1959, pp. 678,679.

[17]Edward E. Panther, "Prediction of First-Grade Reading Achievement," Elementary School Journal, LXVIII (October, 1967), pp. 44-48.

[18]Lee and Clark, op cit., p. 4.

[19]Ibid., p. 7.

The Lee-Clark Reading Readiness Test consists of three parts: Part I, Letter Symbols (Test 1 and 2); Part II, Concepts (Test 3); Part III, Word Symbols (Test 4).

> "Test 1 is a matching test consisting of twelve items with two letters each. The child is to match letters in the first column with corresponding letters in the second column. The test thus measures ability to discern similarities in letter forms.
>
> "Test 2 also consists of twelve items, each with four letters (sometimes of varying size), and measures the child's ability to perceive difference in letter forms....
>
> "Test 3 comprises twenty picture items. The number of pictures in each item ranges from two to five. The child is directed to mark a specific picture in each item. Thus, this test measures each pupil's oral vocabulary, his understanding of concepts, his ability to follow directions, and his knowledge of meanings.
>
> "Test 4 consists of twenty items with five words or letters in each. The child must be able to recognize the stimulus word or letter symbol among the four responses to the right of the line. The test measures ability to recognize both similarities and differences in letter and word formation, from the most simple type of gross difference to complex and minute variations."[20]

The statistics for the Lee-Clark test are based on the responses of children at the end of a full year of kindergarten instruction. The reliability coefficient of the test is 0.96 and the predictive validity coefficients are from .42 to .56.[21]

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[20] Ibid., p. 3.

[21] Ibid., p. 4,6.

## 4. EXPERIMENTAL PROCEDURE

The first test was administered during the first week of December, after five weeks of schooling.* Re-testing was during the week of March 17, 1969, after sixty-six and sixty-nine days, giving each child a school calendar of ninety days, irrespective of individual absences. To facilitate testing, each class was divided into two groups. The morning class had eleven children tested in one session and ten in the other; the afternoon class had ten of the more mature children tested in one session (maturity judged by teacher's observation) and the remaining eight in the other session. All three parts of the test were given at one sitting. For re-testing, those children in the second testing session of the first test, were tested in the first session of the re-test. This scheduling gave each child ninety calendar days of schooling.

Comparison of the results of the December tests will be made between the younger and older children. Similarly, the March tests will be compared. After the March test, an evaluation will be made of any significant differences between the December test of the older children and the March test of the younger children, to determine whether kindergarten training and maturation facilitate reading readiness. An assessment will also be made of the growth in reading readiness of each group as measured by the test.

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*Refer to school calendar, appendix pp. 44, 45.

## 5. PROCEDURE IN TREATING THE DATA

The following steps will be taken to obtain answers to the specific problems, and will provide evidence to support or reject the basic hypotheses. The 0.05 level of confidence (P) will be employed in testing all of the proposed hypotheses.

Hypothesis one stated that kindergarten training has a positive effect upon the reading readiness achievement of all children. This hypothesis will be tested by applying the "T" distribution to a comparison of the means of the December and March tests of the younger children, and similarly to the December and March tests of the older children.

Hypothesis two stated that there is a significant difference in the reading readiness achievement of younger kindergarten children, as measured by the Lee-Clark Reading Readiness Test, when compared with the older kindergarten children. This hypothesis will be tested by applying the "T" distribution to a comparison of the means of the March test of the younger children to the means of the December test of the older children. To further demonstrate this hypothesis, the "T" distribution will be applied to the means of the point gains on the two tests of the younger and the older children.

Hypothesis three stated that younger kindergarten children after kindergarten training do not attain the same level of reading readiness achievement as the older kindergarten children after kindergarten training. This hypothesis will be tested by applying the "T" distribution to the means of the second tests of both groups.

A visual presentation of the two test scores of each child, and his point gain or point loss between the first and second test will be made using graphs. The graphs will also show the relationship of each child to his peers, in reading readiness achievement as measured by the Lee-Clark Reading Readiness Test.

# CHAPTER IV

## 1. RESULTS OF THE STUDY

In discussing the results, all evidence presented is based on test scores achieved on the Lee-Clark Reading Readiness Test -- Kindergarten and Grade 1, 1962 Revision. Scores of the first and second tests, age upon admission to kindergarten, point gain or loss in comparing the tests, are recorded on Tables I and II (pages 27, 28). Raw scores may be found in the Appendix, (pages 39-42). Graphs of the results of the individual scores of both groups and the individual point gain or point loss may be found on pages 29, 30.

The first hypothesis stated: kindergarten training has a positive effect upon the reading readiness achievement of all children. Applying the "T" distribution to the means of the first and second reading readiness tests of the older and younger kindergarten groups disclosed a positive correlation between reading readiness achievement and kindergarten training.

A mean of 47.62 on the first test and 56.19 on the second test was achieved by the older group. The "T" distribution showed a level of significance (P) of less than .01. This indicates that the improvement in reading readiness achievement in older kindergarten children is positively correlated with kindergarten training.

The mean of 39.33 on the first test and 53.12 on the second test was attained by the younger group. Application of the "T" distribution revealed P to be less than .01. This level

of significance indicated that kindergarten training has a positive effect on the reading readiness achievement of younger kindergarten children.

Hypothesis two stated: there is a significant difference in the reading readiness achievement of younger kindergarten children as measured by the Lee-Clark Reading Readiness Test, when compared with the older kindergarten children. After kindergarten exposure, the mean of the test was 53.12 for the younger children. With relatively little kindergarten training (five weeks of disrupted schooling) the older children had a mean of 47.62. Comparing the difference of the means by the "T" distribution, P is .05, thereby indicating a positive relationship between achievement in reading readiness and kindergarten training in younger kindergarten children.

A comparison of the means of the point gain of the younger and older children in the two tests, shows a level of significance of .055 when the "T" distribution is applied. This test, too, is indicative of the positive relationship between reading readiness achievement and kindergarten training in younger children.

Hypothesis three stated: younger kindergarten children after kindergarten training do not attain the same level of reading readiness achievement as the older kindergarten children after kindergarten training. Employing the "T" distribution to the mean of the younger group's first test (39.33) to the

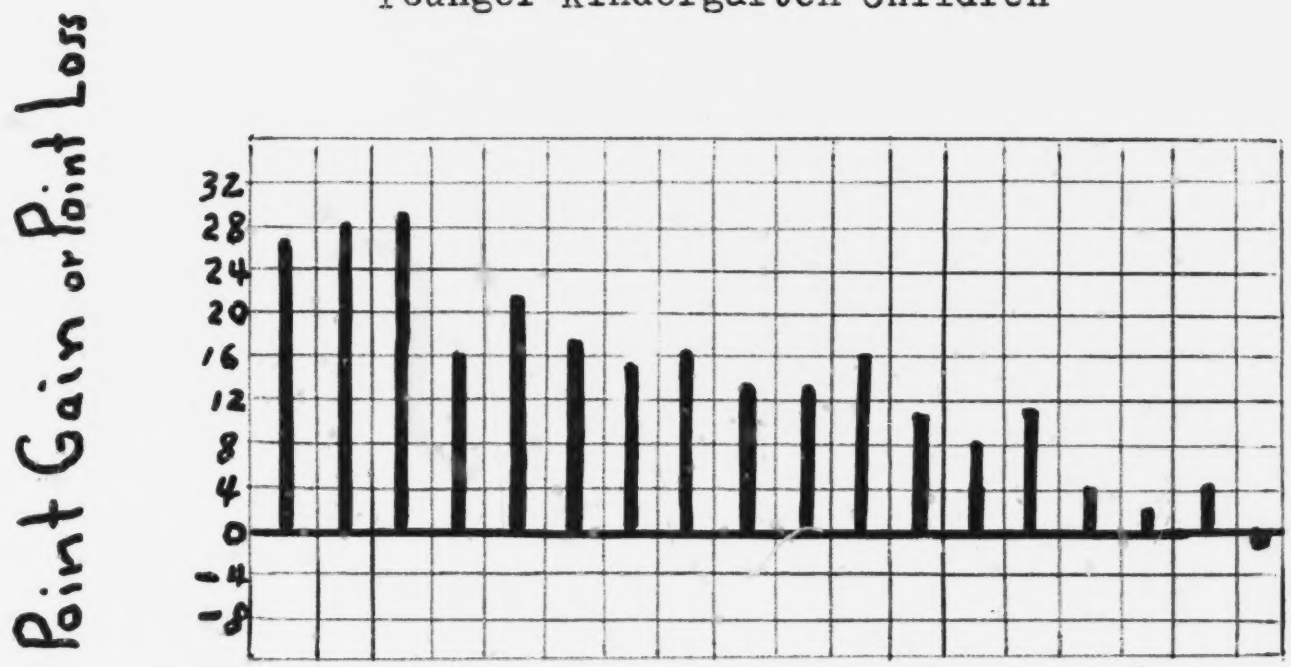
Table 1. COMPARISON OF TEST SCORES - YOUNGER CHILDREN

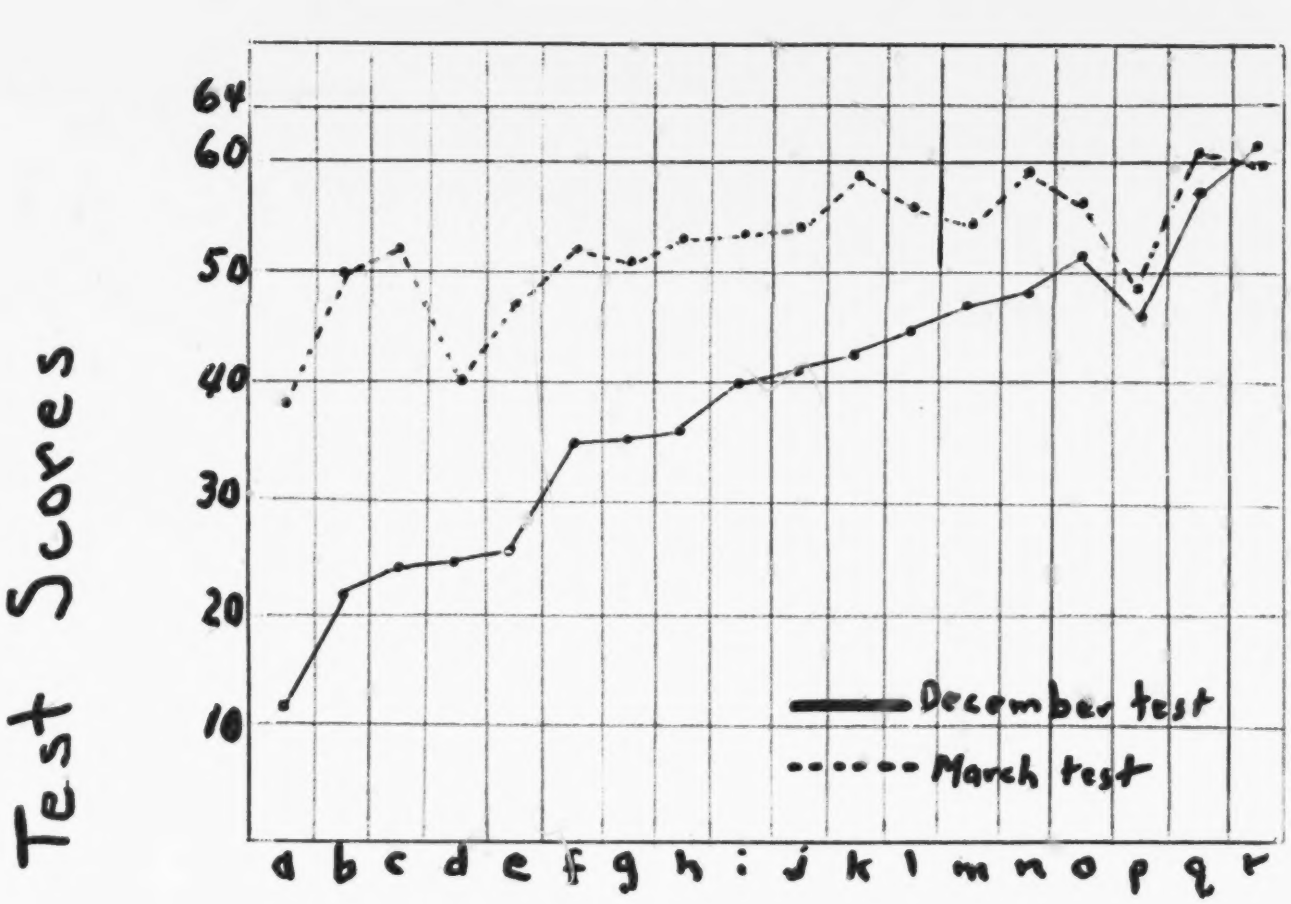
| Child | Age as of Sept. 1969 yrs. - mos. | December Test Score | March Test Score | Point Rise or Loss |
|---|---|---|---|---|
| a | 4 9 | 12 | 38 | 26 |
| b | 4 10 | 22 | 50 | 28 |
| c | 5 1 | 24 | 53 | 29 |
| d | 4 9 | 25 | 41 | 16 |
| e | 4 9 | 26 | 47 | 21 |
| f | 4 10 | 35 | 52 | 17 |
| g | 4 10 | 36 | 51 | 15 |
| h | 4 10 | 37 | 53 | 16 |
| i | 4 9 | 40 | 53 | 13 |
| j | 4 10 | 41 | 54 | 13 |
| k | 4 11 | 43 | 59 | 16 |
| l | 4 9 | 46 | 56 | 10 |
| m | 4 9 | 47 | 55 | 8 |
| n | 4 9 | 48 | 59 | 11 |
| o | 4 10 | 52 | 56 | 4 |
| p | 4 10 | 56 | 58 | 2 |
| q | 4 9 | 57 | 61 | 4 |
| r | 4 11 | 61 | 60 | -1 |
| Mean | 4 yrs.10 mos. | 39.33 | 53.12 | 13.77 |

Table 2. COMPARISON OF TEST SCORES - OLDER CHILDREN

| Child | Age as of Sept. 1969 yrs. - mos. | December Test Score | March Test Score | Point Rise or Loss |
|---|---|---|---|---|
| A | 5 6 | 27 | 53 | 26 |
| B | 5 7 | 33 | 55 | 22 |
| C | 5 6 | 34 | 51 | 17 |
| D | 5 7 | 35 | 56 | 21 |
| E | 5 6 | 36 | 41 | 5 |
| F | 5 8 | 39 | 51 | 12 |
| G | 5 7 | 43 | 59 | 16 |
| H | 5 5 | 45 | 59 | 14 |
| I | 5 7 | 45 | 55 | 10 |
| J | 5 5 | 49 | 58 | 9 |
| K | 5 6 | 49 | 55 | 6 |
| L | 5 7 | 49 | 55 | 6 |
| M | 5 5 | 52 | 58 | 6 |
| N | 5 5 | 53 | 61 | 8 |
| O | 5 6 | 56 | 58 | 2 |
| P | 5 7 | 57 | 53 | -4 |
| Q | 5 7 | 59 | 60 | 1 |
| R | 5 6 | 59 | 60 | 1 |
| S | 5 7 | 60 | 62 | 2 |
| T | 5 7 | 60 | 60 | 0 |
| U | 5 7 | 60 | 60 | 0 |
| Mean | 5 yrs. 7 mos. | 47.62 | 56.19 | 8.57 |

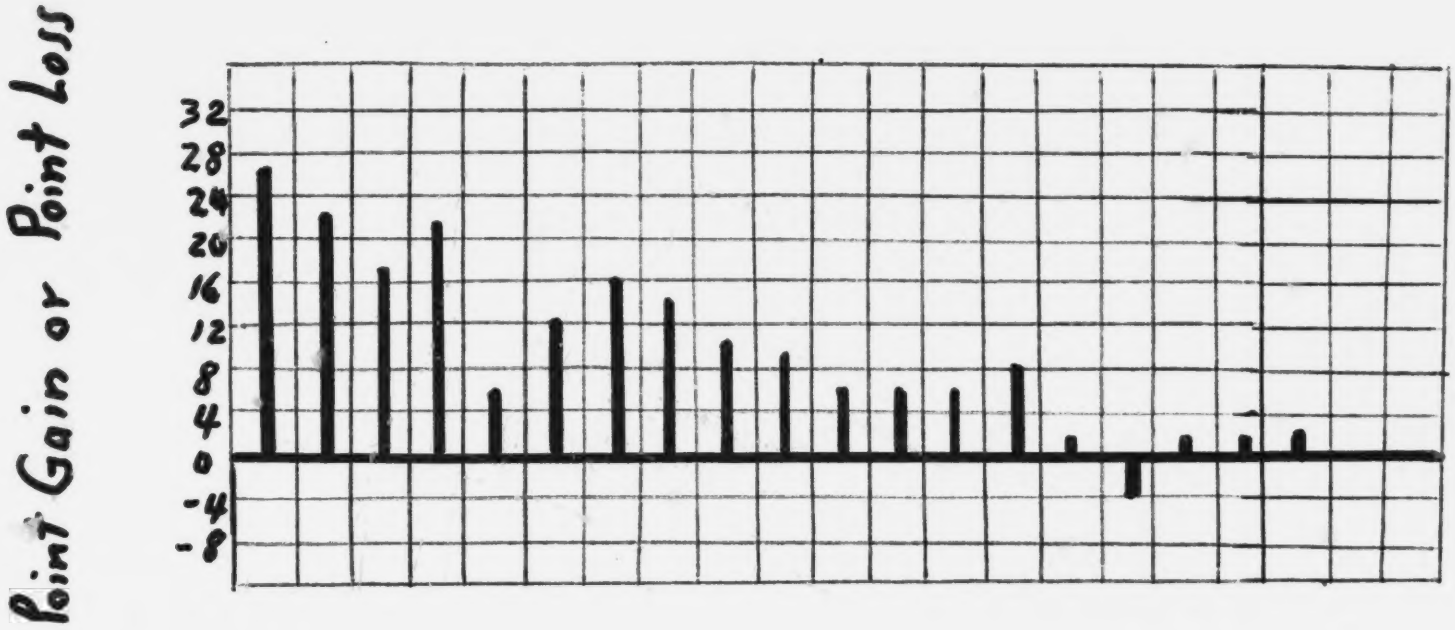
Graph 1. Individual Point Loss or Point Gain in Test Results of the December and March Lee-Clark Reading Readiness Tests of the Younger Kindergarten Children

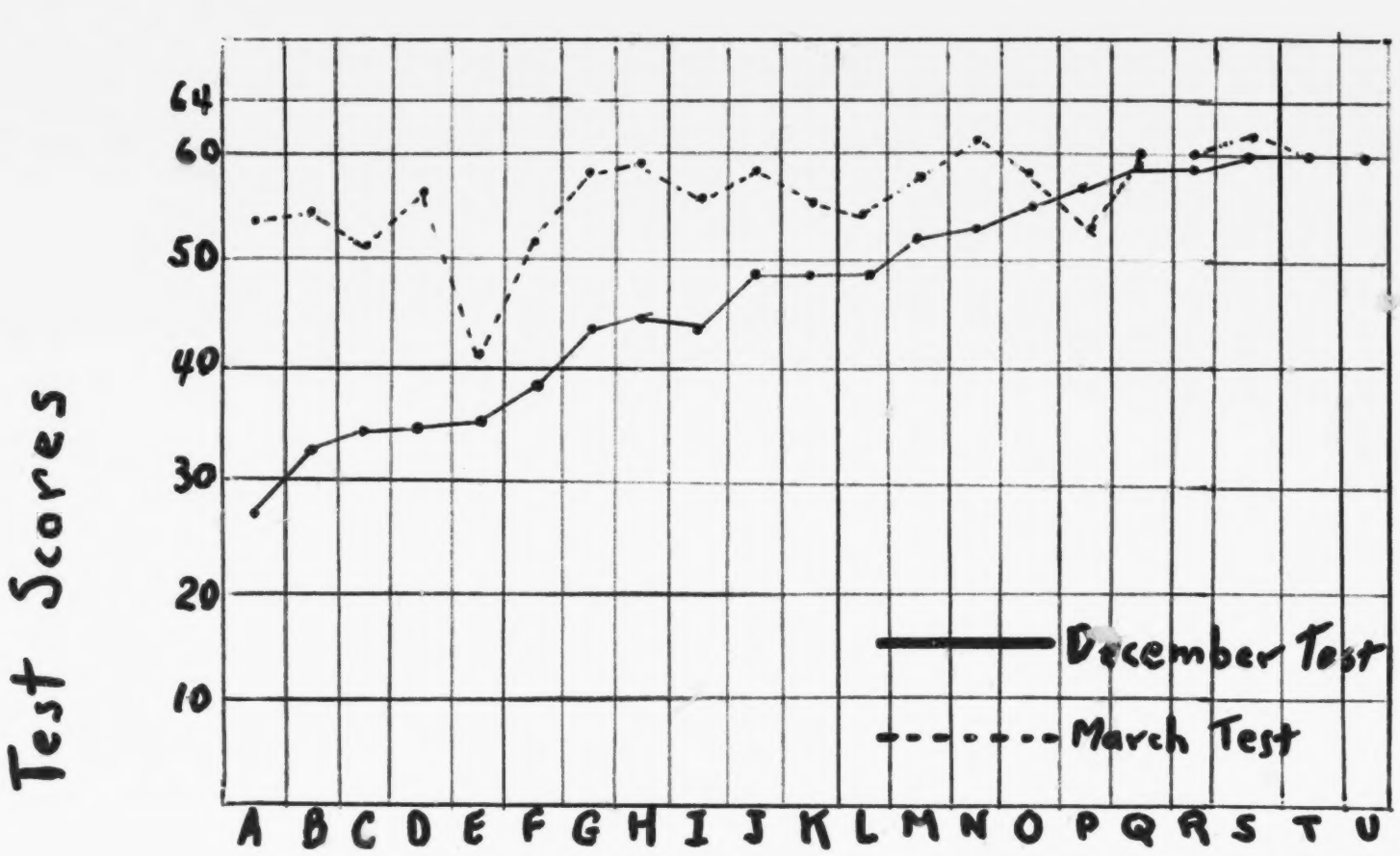



Graph 2. Comparison of Individual Test Results of the Younger Kindergarten Children in the December and March Lee-Clark Reading Readiness Tests

Graph 3. Individual Point Loss or Point Gain in Test Results of the December and March Lee-Clark Reading Readiness Tests of the Older Kindergarten Children




Graph 4. Comparison of Individual Test Results of the Older Kindergarten Children in the December and March Lee-Clark Reading Readiness Tests

mean of the older group's first test (47.62) showed P to be .02. This level of significance shows that before kindergarten training, maturation is the telling factor in determining reading readiness.

Comparison of the mean of the younger group's second test (53.12) to the mean of the older group's second test (56.19) shows P to be .083. The hypothesis is therefore not confirmed because the level of significance is not conclusive.

## 2. DISCUSSION OF RESULTS AND IMPLICATIONS FOR FUTURE RESEARCH

Significant levels of correlation were ascertained in comparing the two reading readiness scores of both the older and younger groups. P was less than .01 in both cases, indicating that the improvement in reading readiness achievement of the younger and older children was due to kindergarten training. Additionally, the .05 level of significance obtained when the scores of the second test of the younger children to those of the first test of the older children, indicates that kindergarten training affected the reading readiness achievement of the former. At the time of the first test (December), the older group had a mean age of five years, ten months, while the younger group had a mean age of five years, one month. At the second test in March, the younger children had a mean age of five years, four months. These facts indicated that maturation alone wouldn't have accounted for the younger children's significant rise in achievement in reading readiness.

A deduction may be made, therefore, that kindergarten training will affect the reading readiness achievement of all children attending kindergarten. As a corollary, one may also say that without kindergarten training, maturation plays a great part in affecting reading readiness achievement of all children. This latter statement was proved by comparing the first test scores of the younger and older children and obtaining a P of .02.

A visual concept of the test scores and the point gain or point loss of the individual child in each group can be had by looking at graphs 1 to 4 (pages 29,30). These graphs illustrate the greater growth in reading readiness achievement of the younger children. Significantly, a P of .055, in comparing the gain of the younger to the older children seems to corroborate the latter statement. Perhaps, because the younger children start lower, their rate of rise is more dramatic. Re-testing at a later date and comparison with the Lee-Clark Test results seem indicated.

Referring to the third hypothesis, whereby an inconclusive level of significance of .083 was obtained when the March tests of both groups were compared, the inferences are that the growth in reading readiness achievement of the younger children may have been greater if the uncontrolled variables in this study were regulated. It may be that younger kindergarten children should be given a longer school day to compensate for their lack of normal physical, mental and

emotional maturation which accompanies age. Therefore, there exists a possibility that given the advantage of compensatory educational time, the younger children would achieve the same competence as the older children.

According to the research literature to date, younger children have more difficulty in achievement throughout their school years, when compared with their grade peers who entered school six months or more older than they. On the other hand, there is a possibility raised by the smaller rise in point gain by the older group (between the first and second tests), that at a certain point, children reach a plateau in learning and "level off" due to maturation processes. This suggests that retesting and further study be done to ascertain whether this plateau is common to all children. More investigation is necessary to determine why there was a significant disparity in the point gain of the two groups.

With a P of .083 in comparing the second tests of both groups, no definite statement can be made determining whether the younger group matured and improved in reading readiness sufficiently to enter first grade on a par with their peers in the older group. On the face of it, the younger group appears to have almost achieved that equality, but further study and subsequent testing seems indicated.

Another question raises itself. Did the Lee-Clark Reading

Readiness Test measure sufficient areas in reading readiness to adequately evaluate the readiness of each group when compared to the other? It is apparent to the investigator in working with the two classes, that a significant difference in maturity and readiness exists. This is evidenced by the better language ability, performance in attacking problems, working habits, and self-sufficiency of the older group as observed by the researcher.

As stated in the manual of this test (appendix, page 43), the time of testing was suggested for the end of kindergarten or beginning of first grade. The December test took place after twenty-one or twenty-four days of a disrupted school calendar. At that time, fifteen children in the older group and ten in the younger group were rated ready to read. (Those with a score of 40 or more). It is the researcher's opinion that despite their scores, those twenty-five children were not then ready to read without a delay of six to eight months. It was apparent in their classroom work, that this group of twenty-five children needed a lengthening of their attention span and training in listening, following directions, manipulative skills, and language skills (ability to understand and speak English, verbalize experiences, interpret pictures, an awareness of the meaning and use of new words, and the desire for learning to read and write).

In addition, at the second testing, after ninety calendar school days, all of the older and younger children, with one

exception in the latter group, were rated ready to read. Again, the investigator feels that not all of the children were ready to read without delay. Some of the children were still immature in their language skills, manipulative skills and still had a very short attention span. This, too, points to a need for further and wider areas to be tested in assessing reading readiness in the kindergarten.

Inferences may be drawn from the significant rate of gain in the test scores of the younger children and the seeming plateau reached by the older children. National concern with Headstart Programs have publicized the rapid growth of the children in these programs and their seeming lack of continued gains in public elementary schools. This study seems to point to a leveling-off or plateau or a slower rate of learning in children of six years of age. It is possible that this same phenomenon occurs in first and second graders and that future evaluation of Headstarters will have to be evaluated in a continuing testing program throughout the grades in comparison with non-Headstart children.

Too often, in evaluating the learning progress of children no allowance is made for the extraneous variables of teaching ability, methods of teaching and the curriculum. Curriculum and methods of teaching will have to be appraised, then modified or changed to equalize the opportunities of one group of children as compared with another group. This is a necessary adjunct to any program of group testing of young children in

school situations. It would help alleviate the inequalities and variables which children face with different teachers and programs, and which may very well hamper the children's achievement. e.g. Given two groups of normal children of average intelligence, learning in Teacher A's class may be limited to exposure to a play program with little or no reading readiness training; exposure to Teacher B may give the other group a full range of kindergarten activities including a specific reading readiness program. Successful teachers in Early Childhood should be studied to determine which methods and/or curriculum have made for their success in helping kindergarten children to achieve. With the results of such a study, more training and/or re-training of teachers in the area of reading readiness in the kindergarten would help to equalize the opportunities of all children in a given school system.

Another factor to be considered, evidenced by the smaller gain, and even loss, of those children with an initial score of 50 or more on the first tests, is the possibility that the Lee-Clark Reading Readiness Test did not have a high enough ceiling to determine which children are more capable in reading readiness and therefore more ready to begin a formal reading program upon entrance to first grade. A wider area of ability evaluation in a reading readiness test would enhance a teacher's understanding of a child's progress over and above her own appraisal of the child's progress, and make for better processing in reading programs for each child

upon entrance to first grade. Evaluation of children and subsequent placement in first grade by such a test would be of distinct help to the inexperienced teacher and additional support to experienced teachers, especially with borderline cases. In the latter instance, a child may be inadvisedly promoted or held back leading to his emotional, psychological, parental, peer and educational disorganization. Concomitant with the use of this type of evaluation and testing program in the kindergarten, an administrative awareness is needed to provide the curriculum and teachers necessary to continue educating the child, recognizing his individual capabilities and needs.

# CHAPTER V

# SUMMARY AND CONCLUSIONS

## 1. SUMMARY

This study, using the Lee-Clark Reading Readiness Test -- Kindergarten and Grade 1, 1962 Revision as a measuring device, ascertained that kindergarten training has a positive effect upon the reading readiness achievement of kindergarten children of disparate entrance ages. It further indicated that there is a significant difference in the rate of rise in the reading readiness achievement of younger kindergarten children when compared to the older kindergarten children. This study was inconclusive in determining whether younger kindergarten children after kindergarten training attained the same level of reading readiness achievement as the older kindergarten children after kindergarten training.

## 2. CONCLUSIONS

On the basis of the small sample involved in this study, the researcher concludes that exposure to kindergarten has a positive effect on achievement in reading readiness of kindergarten children of disparate entrance ages. Therefore, early exposure to formal school training seems indicated for all children. Finally, in the interests of better prognosis for reading achievement in the elementary grades, a reevaluation and revision of the present available reading readiness tests for use in the kindergarten is suggested.

# APPENDIX



Table 3. Raw Scores of Younger Children in the December and March Lee-Clark Reading Readiness Tests

| Child | Month | Letter Symbols | Concepts | Word Symbols | Total Score | Grade Placement | Expectation of Success |
|---|---|---|---|---|---|---|---|
| a | Dec. | 6 | 5 | 1 | 12 | 0.0 | Poor |
| | Mar. | 10 | 16 | 11 | 38 | 0.6 | Fair |
| b | Dec. | 6 | 13 | 3 | 22 | 0.1 | Poor |
| | Mar. | 21 | 17 | 12 | 50 | 1.3 | Good |
| c | Dec. | 2 | 15 | 7 | 24 | 0.1 | Poor |
| | Mar. | 21 | 17 | 15 | 53 | 1.6 | Excellent |
| d | Dec. | 6 | 17 | 2 | 25 | 0.1 | Poor |
| | Mar. | 18 | 18 | 5 | 41 | 0.7 | Good |
| e | Dec. | 5 | 18 | 3 | 26 | 0.1 | Poor |
| | Mar. | 21 | 16 | 10 | 47 | 1.0 | Good |
| f | Dec. | 13 | 17 | 5 | 35 | 0.5 | Fair |
| | Mar. | 22 | 17 | 13 | 52 | 1.5 | Excellent |
| g | Dec. | 18 | 16 | 2 | 36 | 0.5 | Fair |
| | Mar. | 21 | 15 | 15 | 51 | 1.4 | Good |
| h | Dec. | 13 | 16 | 8 | 37 | 0.6 | Fair |
| | Mar. | 21 | 18 | 14 | 53 | 1.6 | Excellent |
| i | Dec. | 16 | 16 | 8 | 40 | 0.7 | Good |
| | Mar. | 22 | 17 | 14 | 53 | 1.6 | Excellent |
| j | Dec. | 22 | 15 | 4 | 41 | 0.7 | Good |
| | Mar. | 24 | 15 | 15 | 54 | 1.7 | Excellent |
| k | Dec. | 22 | 16 | 5 | 43 | 0.8 | Good |
| | Mar. | 23 | 19 | 17 | 59 | 1.9+ | Excellent |
| l | Dec. | 21 | 16 | 9 | 46 | 0.9 | Good |
| | Mar. | 24 | 17 | 15 | 56 | 1.9+ | Excellent |
| m | Dec. | 19 | 17 | 11 | 47 | 1.0 | Good |
| | Mar. | 19 | 18 | 18 | 55 | 1.8 | Excellent |

Table 3. Continued

| Child | Month | Letter Symbols | Concepts | Word Symbols | Total Score | Grade Placement | Expectation of Success |
|---|---|---|---|---|---|---|---|
| n | Dec. | 17 | 15 | 16 | 48 | 1.1 | Good |
| | Mar. | 22 | 18 | 19 | 59 | 1.9+ | Excellent |
| o | Dec. | 20 | 17 | 15 | 52 | 1.5 | Excellent |
| | Mar. | 22 | 19 | 15 | 56 | 1.9+ | Excellent |
| p | Dec. | 22 | 19 | 15 | 56 | 1.9+ | Excellent |
| | Mar. | 24 | 19 | 15 | 58 | 1.9+ | Excellent |
| q | Dec. | 20 | 18 | 19 | 57 | 1.9+ | Excellent |
| | Mar. | 23 | 18 | 20 | 61 | 1.9+ | Excellent |
| r | Dec. | 24 | 17 | 10 | 61 | 1.9+ | Excellent |
| | Mar. | 24 | 17 | 19 | 60 | 1.9+ | Excellent |

Table 4. Raw Scores of Older Children in the December and March Lee-Clark Reading Readiness Tests

| Child | Month | Letter Symbols | Concepts | Word Symbols | Total Score | Grade Placement | Expectation of Success |
|---|---|---|---|---|---|---|---|
| A | Dec. | 9 | 14 | 4 | 27 | 0.2 | Poor |
| | Mar. | 21 | 16 | 16 | 53 | 1.6 | Excellent |
| B | Dec. | 10 | 14 | 9 | 33 | 0.4 | Fair |
| | Mar. | 23 | 17 | 15 | 55 | 1.8 | Excellent |
| C | Dec. | 14 | 16 | 4 | 34 | 0.4 | Fair |
| | Mar. | 22 | 17 | 12 | 51 | 1.4 | Good |
| D | Dec. | 8 | 17 | 10 | 35 | 0.5 | Fair |
| | Mar. | 18 | 18 | 20 | 56 | 1.9+ | Excellent |
| E | Dec. | 18 | 16 | 2 | 36 | 0.5 | Fair |
| | Mar. | 19 | 16 | 6 | 41 | 0.7 | Good |
| F | Dec. | 11 | 15 | 13 | 39 | 0.6 | Fair |
| | Mar. | 19 | 15 | 17 | 51 | 1.4 | Good |
| G | Dec. | 15 | 17 | 11 | 43 | 0.8 | Good |
| | Mar. | 22 | 19 | 18 | 59 | 1.9+ | Excellent |
| H | Dec. | 14 | 17 | 14 | 45 | 0.9 | Good |
| | Mar. | 22 | 18 | 19 | 59 | 1.9+ | Excellent |
| I | Dec. | 12 | 18 | 15 | 45 | 0.9 | Good |
| | Mar. | 22 | 18 | 15 | 55 | 1.8 | Excellent |
| J | Dec. | 19 | 15 | 15 | 49 | 1.2 | Good |
| | Mar. | 22 | 17 | 19 | 58 | 1.9+ | Excellent |
| K | Dec. | 20 | 17 | 12 | 49 | 1.2 | Good |
| | Mar. | 22 | 18 | 15 | 55 | 1.8 | Excellent |
| L | Dec. | 19 | 16 | 14 | 49 | 1.2 | Good |
| | Mar. | 24 | 16 | 15 | 55 | 1.8 | Excellent |
| M | Dec. | 23 | 16 | 13 | 52 | 1.5 | Excellent |
| | Mar. | 22 | 17 | 19 | 58 | 1.9+ | Excellent |

Table 4. Continued

| Child | Month | Letter Symbols | Con-cepts | Word Symbols | Total Score | Grade Place-ment | Expectation of Success |
|---|---|---|---|---|---|---|---|
| N | Dec. | 18 | 18 | 17 | 53 | 1.6 | Excellent |
| | Mar. | 22 | 19 | 20 | 61 | 1.9+ | Excellent |
| O | Dec. | 22 | 19 | 15 | 56 | 1.9+ | Excellent |
| | Mar. | 21 | 18 | 19 | 58 | 1.9+ | Excellent |
| P | Dec. | 22 | 19 | 16 | 57 | 1.9+ | Excellent |
| | Mar. | 23 | 18 | 12 | 53 | 1.6 | Excellent |
| Q | Dec. | 24 | 17 | 18 | 59 | 1.9+ | Excellent |
| | Mar. | 24 | 19 | 17 | 60 | 1.9+ | Excellent |
| R | Dec. | 22 | 19 | 18 | 59 | 1.9+ | Excellent |
| | Mar. | 24 | 16 | 20 | 60 | 1.9+ | Excellent |
| S | Dec. | 24 | 19 | 17 | 60 | 1.9+ | Excellent |
| | Mar. | 23 | 20 | 19 | 62 | 1.9+ | Excellent |
| T | Dec. | 22 | 18 | 20 | 60 | 1.9+ | Excellent |
| | Mar. | 24 | 16 | 20 | 60 | 1.9+ | Excellent |
| U | Dec. | 22 | 18 | 20 | 60 | 1.9+ | Excellent |
| | Mar. | 22 | 18 | 20 | 60 | 1.9+ | Excellent |

Note: Original Manuscript has copy of the following attached:

"Manual, Lee-Clark Reading Readiness Test, Kindergarten and Grade I", Lee, J. Murray and Clark, Willis W., Monterey, California: California Test Bureau, 1962.

# NEW YORK CITY SCHOOL CALENDAR

## FALL, 1968

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | | <u>September</u> | | | |
| 1 | | | | | | |
| 8 | x | x | 11 | 12 | x | |
| 15 | x | x | x | x | x | |
| 22 | holiday | holiday | x | x | x | |
| 29 | 30 | | | | | |
| | | | <u>October</u> | | | |
| | | 1 | holiday | 3 | 4 | |
| 6 | 7 | 8 | 9 | 10 | 11 | |
| 13 | x | x | x | x | x | |
| 20 | x | x | x | x | x | |
| 27 | x | x | x | x | | |
| | | | <u>November</u> | | | |
| | | | | | x | |
| 3 | x | holiday | x | x | x | |
| 10 | holiday | x | x | x | x | |
| 17 | x | 19 | 20 | 21 | 22 | |
| 24 | 25* | 26 | 27 | holiday | 29 | |

*Beginning of additional 45 minutes instructional time each day.

Sundays and schooldays are designated by numerals. School days missed due to the teachers' strike are designated by "x".

NEW YORK CITY CALENDAR

Continued

| | |
|---|---|
| December | 2, 3, 4, 5, 6<br>9, 10, 11, 12, 13<br>16, 17, 18, 19, 20<br>23, 26, 27 |
| January | 2, 3<br>6, 7, 8, 9, 10<br>13, 14, 15, 16, 17<br>20, 21, 22, 23, 24<br>27, 28, 29, 30, 31 |
| February | 3, 4, 5, 6, 7<br>Snow Emergency Days, School Closed<br>14, 17, 18, 19, 20, 21<br>24, 25, 26, 27, 28 |
| March | 3, 4, 5, 6, 7<br>10, 11, 12, 13, 14<br>17, 18, 19, 20, 21 |

Total calendar school days - 90.

Computation: EXAMPLE OF APPLICATION OF THE T DISTRIBUTION TO THE SCORES OF THE SECOND TEST OF THE YOUNGER GROUP AND THE FIRST TEST OF THE OLDER GROUP

$X_1$ = Scores of second test of younger group

$X_2$ = Scores of first test of older group

$$\sum x_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{N_1}$$

$$\sum x_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{N_2}$$

$$\sigma_{X_1 - X_2} = \sqrt{\frac{(N_1+N_2)(\sum x_1^2 + \sum x_2^2)}{N_1 N_2 (N_2 - 1 + N_2 - 1)}}$$

$$t = \frac{X_1 - X_2}{\sigma_{X_1 - X_2}}$$

younger group - $N_1 = 18$ $M_1 = 53.12$

older group - $N_2 = 21$ $M_2 = 47.62$

$$\sum x_1^2 = 51426 - \frac{913936}{18} = 652$$

$$\sum x_2^2 = 49778 - \frac{1,000,000}{21} = 2159$$

$$\sigma_{X_1 - X_2} = \sqrt{\frac{39(2811)}{18 \cdot 21 \cdot 37}} = 2.799$$

$$t = \frac{53.12 - 47.62}{2.799} = 1.96$$

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